

REMARKS

Claims 1-9¹ are pending in this application. Claim 1 is amended. No claims are added, canceled or withdrawn. It is respectfully submitted that this Amendment is fully responsive to the Office Action dated April 18, 2005.

Claims 1, 2 and 6-8 were rejected under 35 USC 102(b) as being anticipated by *Nishiguchi* (US 5,461,261, dated 10/24/95). Applicants have amended claim 1. For at least the following reasons, the Listing of Claims on page 2 distinguishes over *Nishiguchi*. Accordingly, withdrawal of the rejection is respectfully requested.

Nishiguchi, column 6, lines 12-25, and Fig. 13, recites that “Au layers 111 and Sn layers 121 are alternately formed by electroplating”, but fails to disclose all of the steps recited in claim 1 of the above-identified application, particularly the step of “*heating the first metal and the second metal to melt and coagulate the first metal and the second metal*”.

Nishiguchi also fails to disclose the step of *heating the first metal to melt and coagulate the first metal* (wherein this step is performed before the step of “supplying a second metal into the opening on the coagulated first metal”). For example, separate sections of the reference that were emphasized by the Examiner in the Office Action disclose:

According to the mounting method of the semiconductor chip of the present invention, there are bumps formed by alternately building up the two layers of metal materials capable of forming a eutectic alloy, so that the eutectic alloy reaction takes place at each boundary surface between layers. Melting of each boundary surface between layers may fully soften the entire bump. (col. 2, lines 25-31, emphasis added)

Since the bump 16 is formed by alternately building up the Au layers and the Sn layers in the present embodiment as described, the Au-Sn eutectic alloy reaction

¹ It appears that the Examiner may have overlooked the addition of claim 9 with the submission of April 7, 2005.

may take place at each boundary surface between layers in mounting. Then, the entire bump 16 may fully soften. (col. 3, lines 58-63, emphasis added)

Nishiguchi fails to disclose the step of *heating the first metal to melt and coagulate the first metal* (wherein this step is performed before the step of “*supplying a second metal into the opening on the coagulated first metal*”) because eutectic bonding takes place in mounting (e.g., at least after supplying a second metal into the opening on the first metal.)

In *Nishiguchi*, the first metal layer starts to melt after the second metal layer is formed.

Also, in item 10 of the Office Action, the Examiner mentions that the “eutectic temperature is the lowest possible melting temperature of the mixture of both metal layers, so that it appears that, inherently, *Nishiguchi* shows that the metals are exposed to an elevated temperature or heating step as the layers are formed on one another.” Applicants respectfully disagree with the Examiner’s assertion.

As the Examiner previously pointed out, in *Nishiguchi*, an eutectic alloy reaction takes place at each boundary surface between two layers. (See, column 3, lines 58-67; column 4, lines 25-39 and column 5, lines 36-45) However, these eutectic alloy reactions take place during the respective steps of forming Au layers or Sn layers at the boundary of the two layers.

Such a eutectic alloy reaction may also take place in this application during a step of supplying second metal into the openings on the first metal by electroplating the same, depending on the material of the first and second metals, although the eutectic alloy reaction is not discussed in the specification of this application. However, this eutectic reaction step is different from a step of heating the first metal to melt and coagulate the first metal and also a step of heating the first metal and the second metal to melt and coagulate the first metal and

second metal. These heating steps are conducted by the outside heat source at a different time from the time at which the eutectic reaction takes place, i.e., after the supply step of first metal (such as by electroplating) and after the supply step of second metal (such as by electroplating).

Accordingly, withdrawal of the rejection of claim 1 is respectfully requested. As claims 2 and 6-9 depend from claim 1, these claims should likewise be allowable in view of the above remarks.

Claims 3-5 were also rejected under 35 U.S.C. 103(a) as being unpatentable over *Nishiguchi* in view of *Nakata et al.* (US 2004/0079194, dated 4/29/04). However, these claims depend from claim 1 and should likewise be allowable in light of the above comments. Accordingly, withdrawal of the rejection of claims 3-5 is respectfully requested.

In view of the aforementioned amendment and accompanying remarks, Applicants submit that the claims, as herein amended, are in condition for allowance. Applicants request such action at an early date.

If the Examiner believes that this application is not now in condition for allowance, the Examiner is requested to contact Applicants' undersigned attorney to arrange for an interview to expedite the disposition of this case.

Application No. 10/771,391
Group Art Unit: 2812

Response under 37 C.F.R. § 1.111
Attorney Docket No. 042080

If this paper is not timely filed, Applicants respectfully petition for an appropriate extension of time. The fees for such an extension or any other fees that may be due with respect to this paper may be charged to Deposit Account No. 50-2866.

Respectfully submitted,

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